



Armed Forces College of Medicine

AFCM

Neuroscience Module/ Prof Azza Kamal



The Cerebral Hemispheres

BY

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&

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Intended Learning Outcomes

By the end of this lecture , the student will be able to:

- 1. List the layers of the cerebral cortex and the cells forming them.**
- 2. Compare between the structure of the sensory and motor cortex.**
- 3. Name the major sulci, gyri, poles & lobes of the cerebral hemispheres.**



Layers of the cerebral cortex

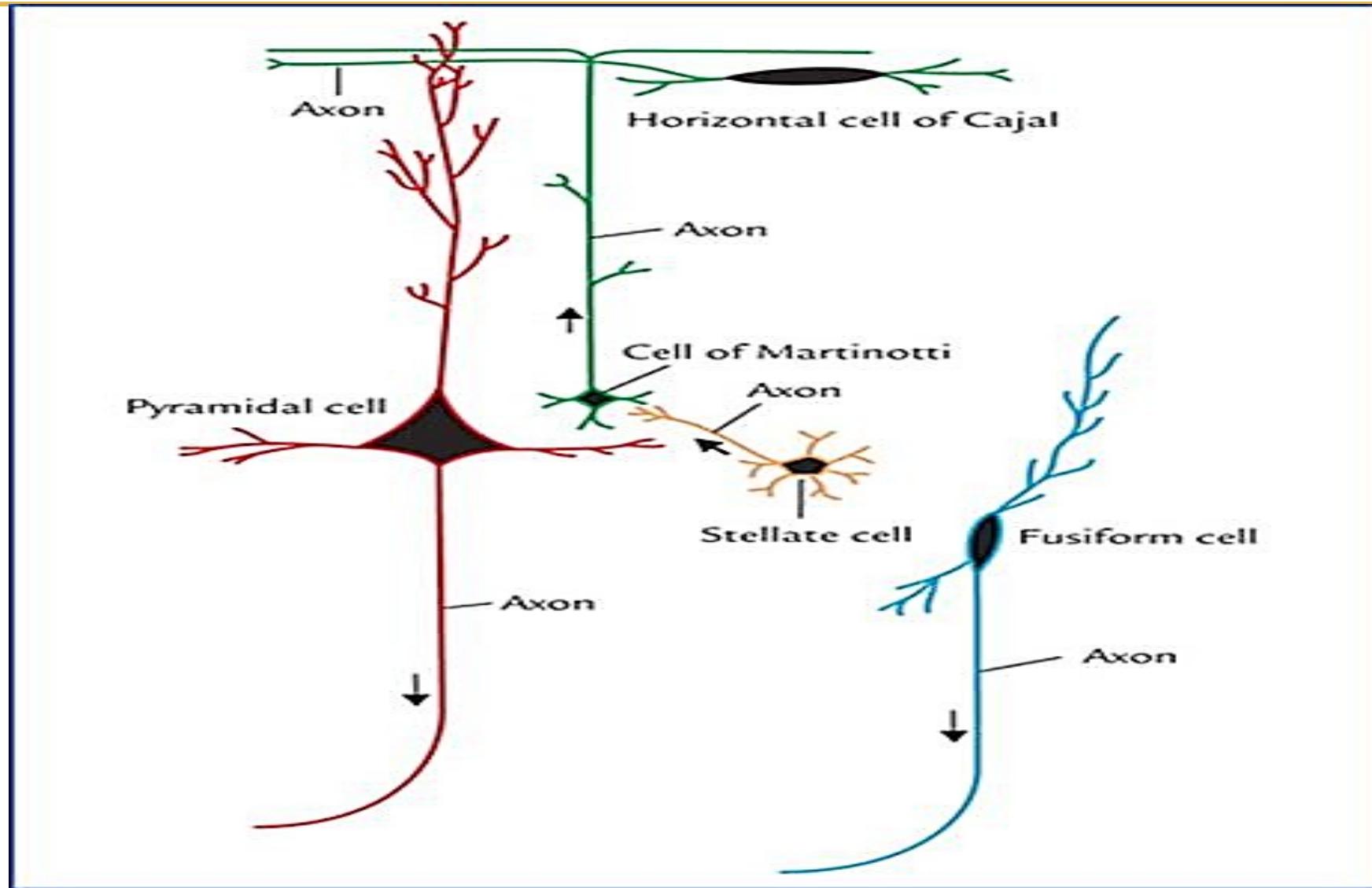


The Cerebral Cortex is formed of six (6) layers



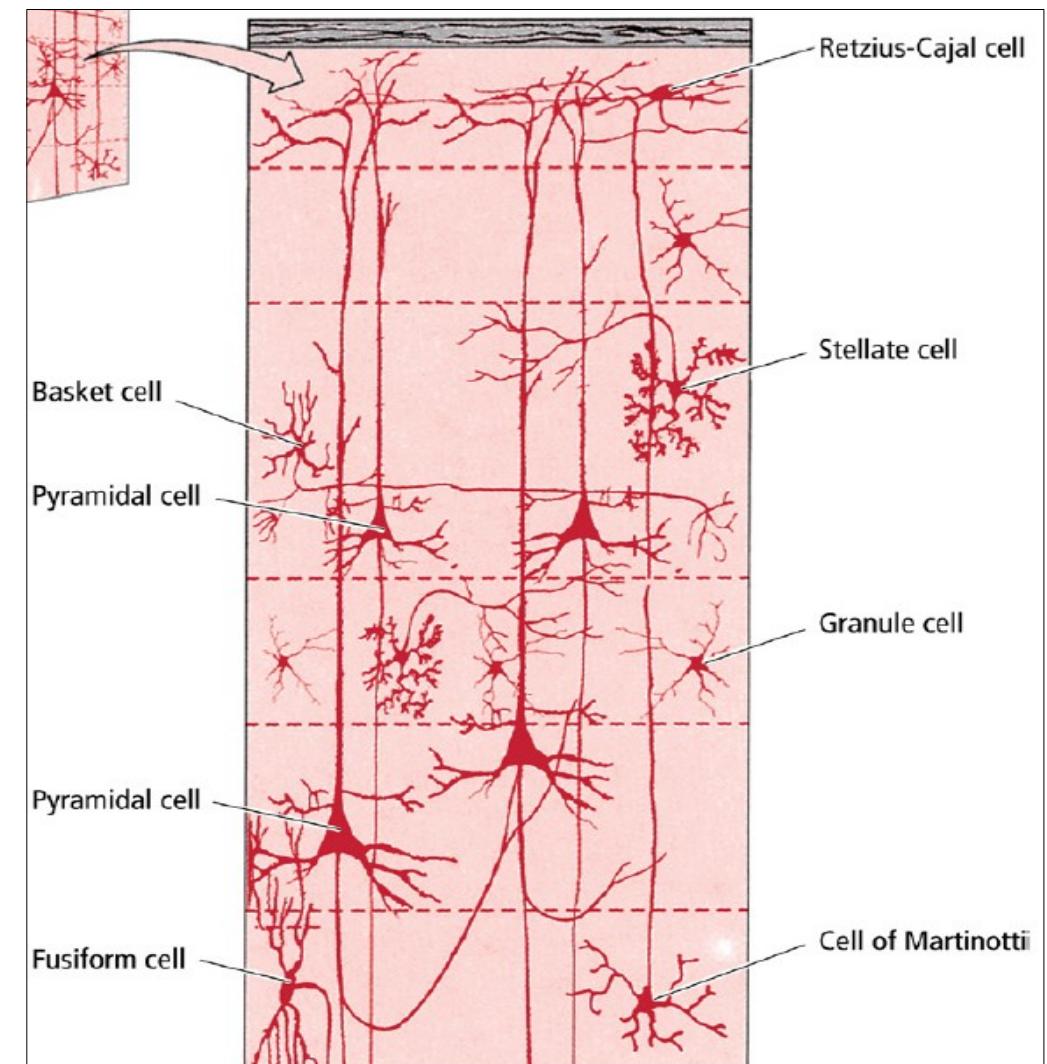
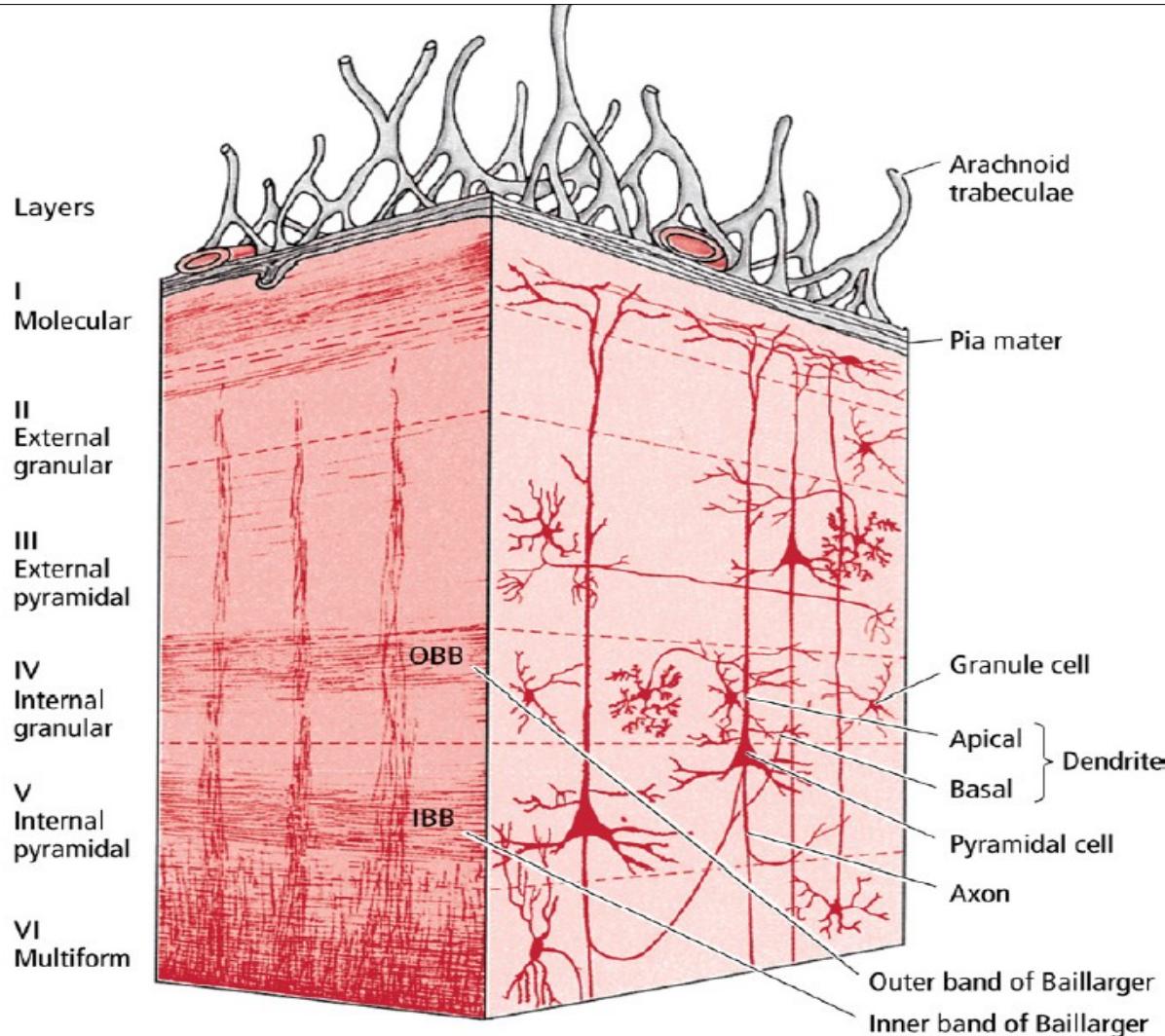


Cells of the cerebral cortex





Layers of the cerebral cortex





1) Molecular layer:

Most superficial layer.

Formed mainly of interlacing nerve fibers and cells of Cajal (absent in adult brain).

Nerve fibers include terminal dendrites of pyramidal and fusiform cells and axons of Martinotti cells

2) External granular layer:

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer.
- Their axons descend to the deep cortical layers.



Layers of the cerebral cortex



3) External pyramidal layer:

- It contains superficial layer of small and medium sized pyramidal cells and deep layer of larger cells.
- Their dendrites pass to the first layer, while their axons enter the white matter.

4) Internal granular layer:

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer
- Their axons descend to the deep cortical layers.
- It also contains the outer band of Baillarger.



Layers of the cerebral cortex



5) Internal pyramidal layer:

Formed of large and giant pyramidal cells.

- Their dendrites pass to the fourth layer
- Their axons project to enter the white matter as projection fibres. **In motor area 4 these cells called giant cells of Betz.**
- It also contains the internal band of Baillarger.

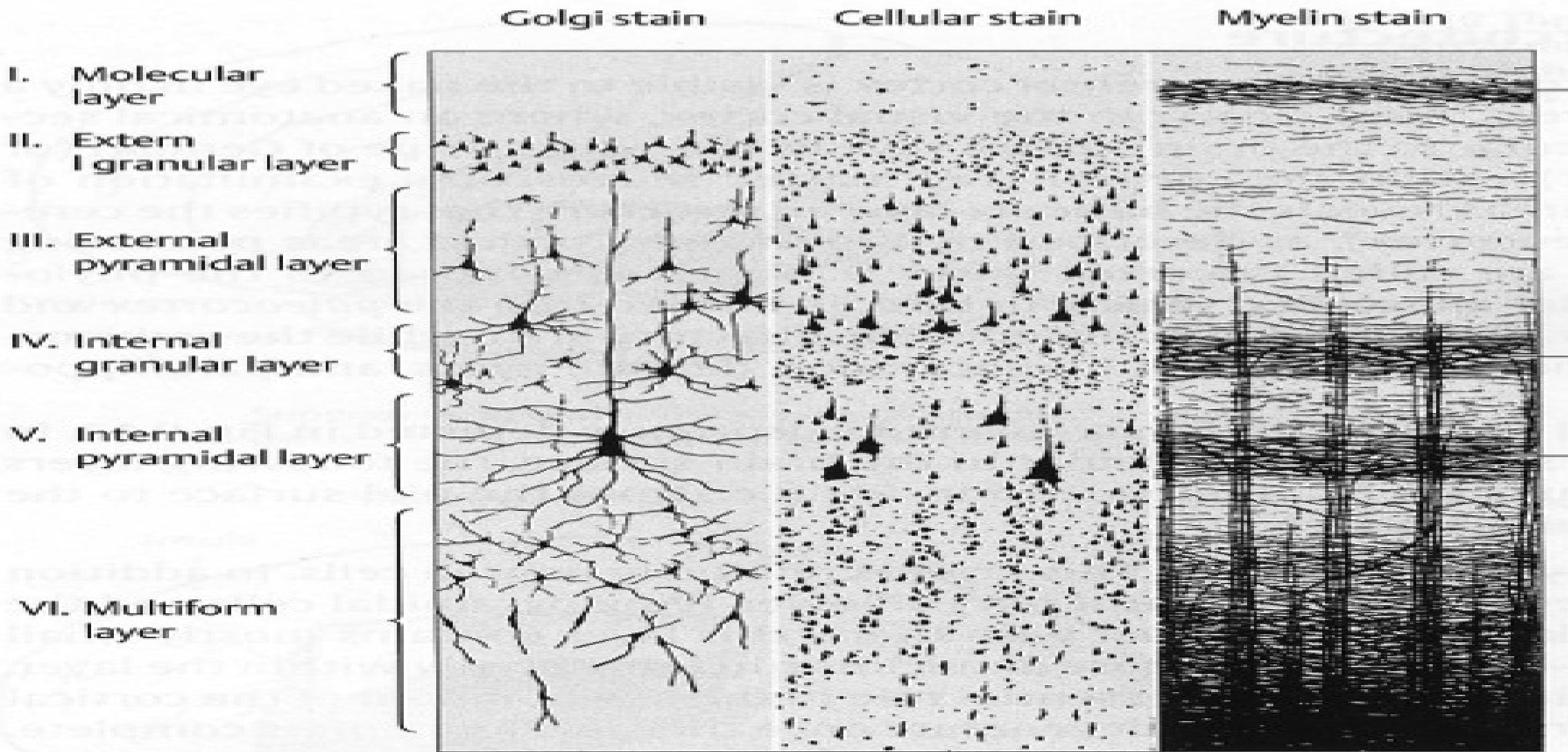
6) The mutiform layer:

It contains fusiform cells.

Their dendrites pass to the molecular layer

- Their axons enter the white matter as projection fibres.





http://www.learnneurosurgery.com/uploads/1/6/6/8/16689668/_8909191_orig.png



Differences between sensory and motor cortex



Motor cortex

- 1) It is the thickest zone in the whole cortex.
- 2) Large pyramidal cells are found in layers III and V , while giant pyramidal cells (Betz) are seen in the fifth layer.
- 3) Granule cells are rare or absent.

Sensory cortex

- 1) It is relatively thinner than motor cortex.
- 2) It contains closely packed granule cells.
- 3) Pyramidal cells are ill defined.



Quiz



1) **Which of the following cells are not found in the cerebrum:**

- a) Pyramidal cells.
- b) Purkinje cells.
- c) Granule cells.
- d) Fusiform cells.
- e) Cells of Martinotti

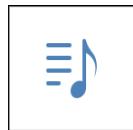
2) **Giant cells of Betz are present in the following layer of the cerebral cortex :**

- a)Pleomorphic
- b) External granular
- c)Internal granular
- d)External pyramidal.
- e) Internal pyramidal.

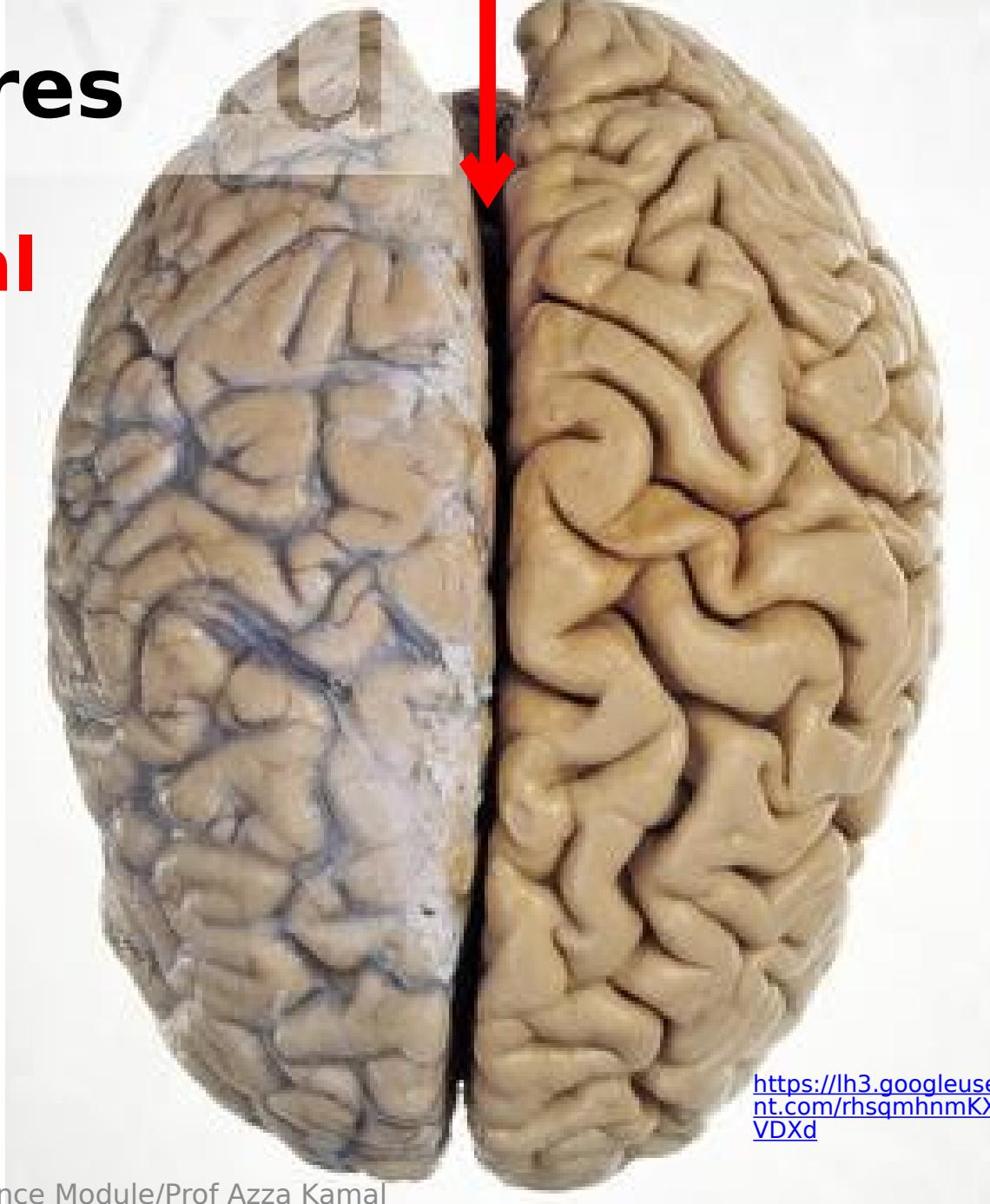


The cerebral hemispheres

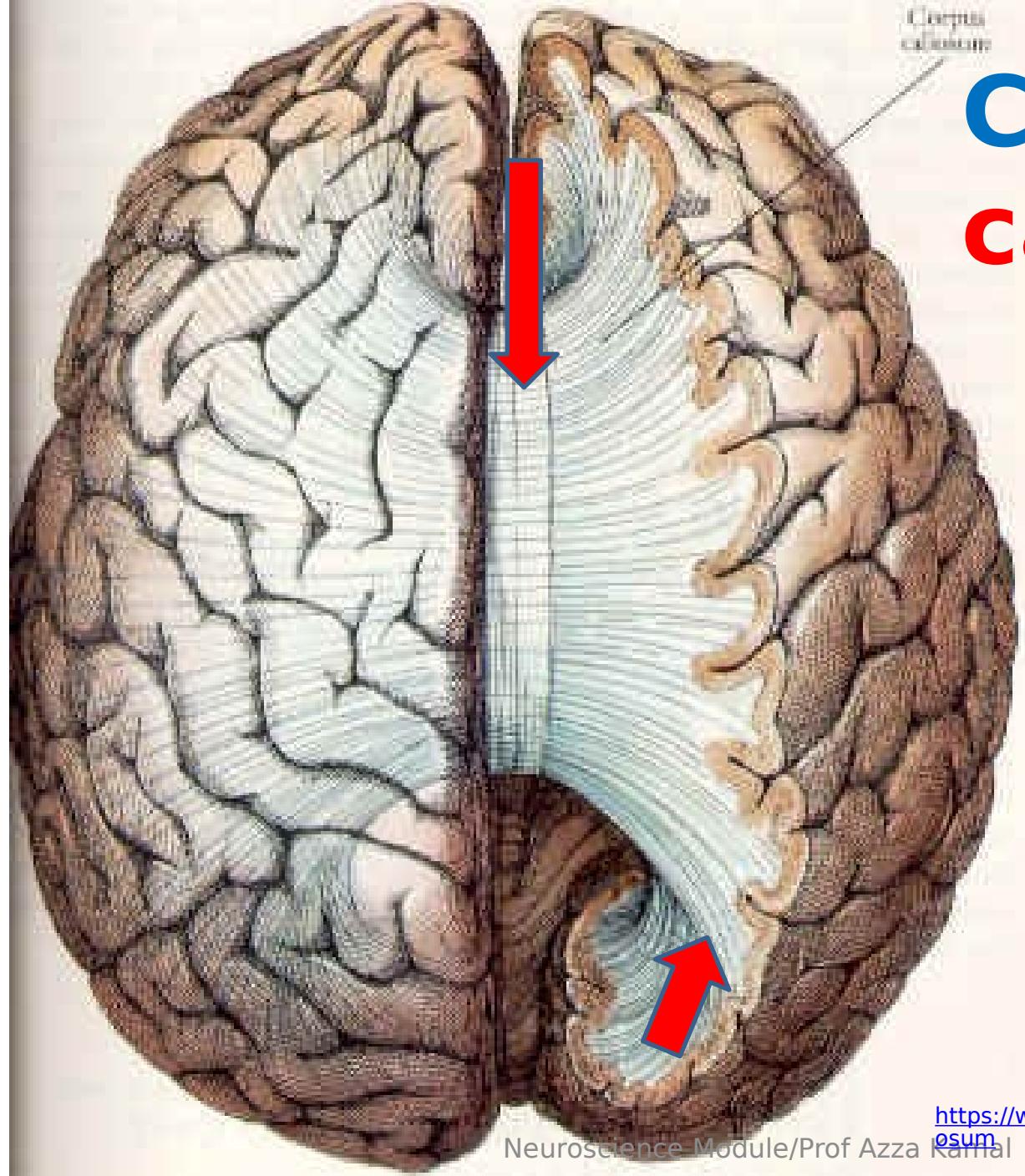
**Right & left
cerebral
hemispheres**



**Longitudinal
fissure**



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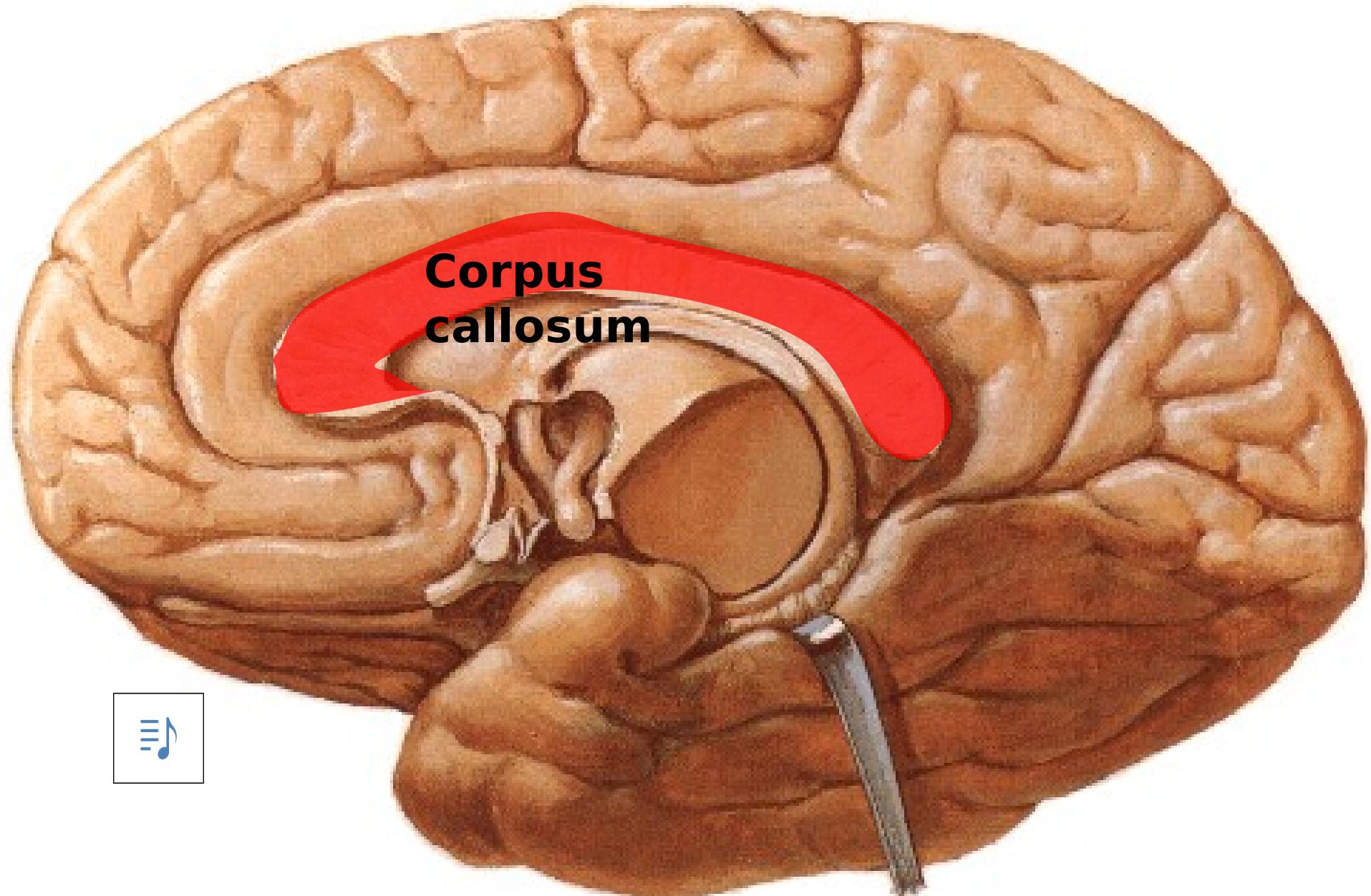


Corpus callosum



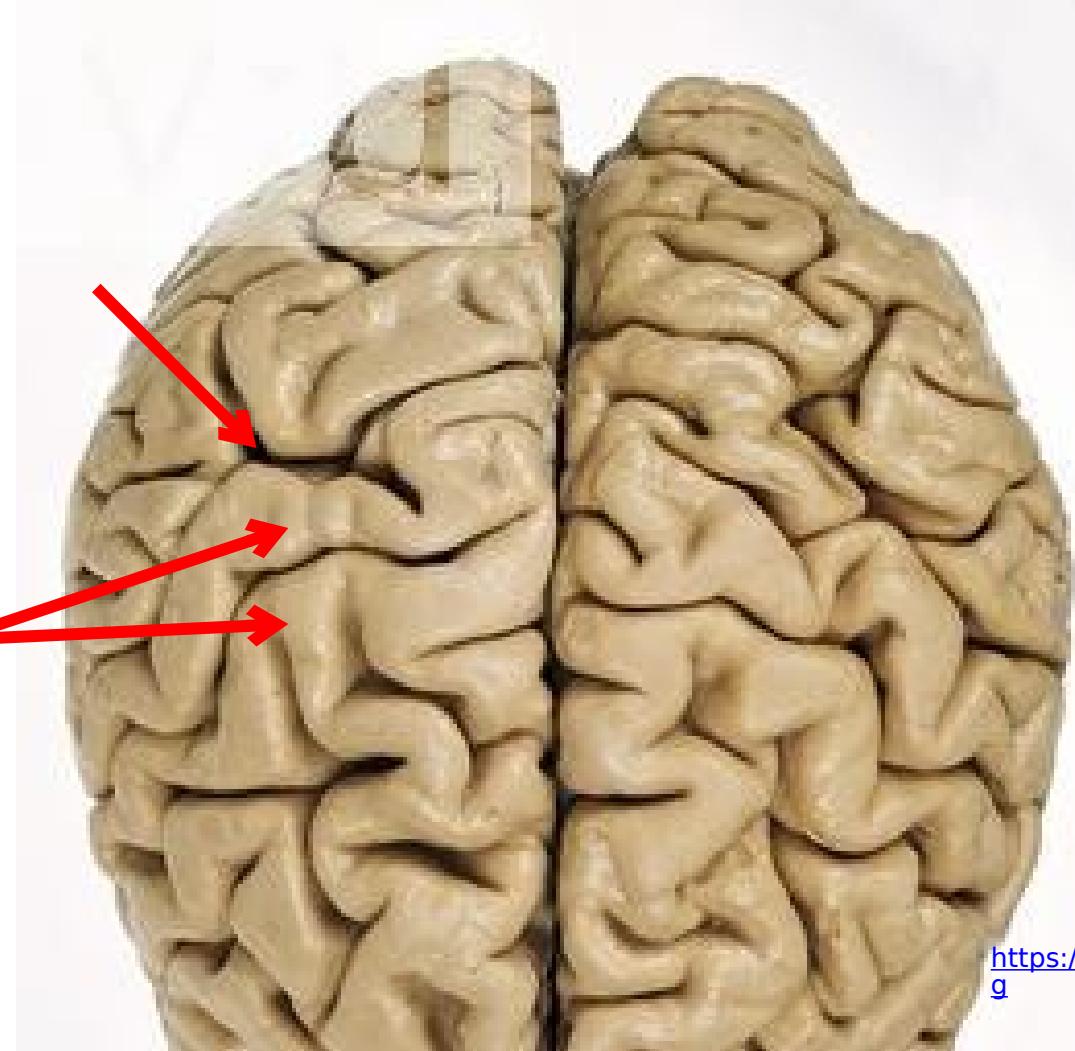
**Commissural
fibers which
connect the right &
left hemispheres**

<https://www.google.com.eg/search?sa=G&hl=en-EG&q=corpus+callosum>





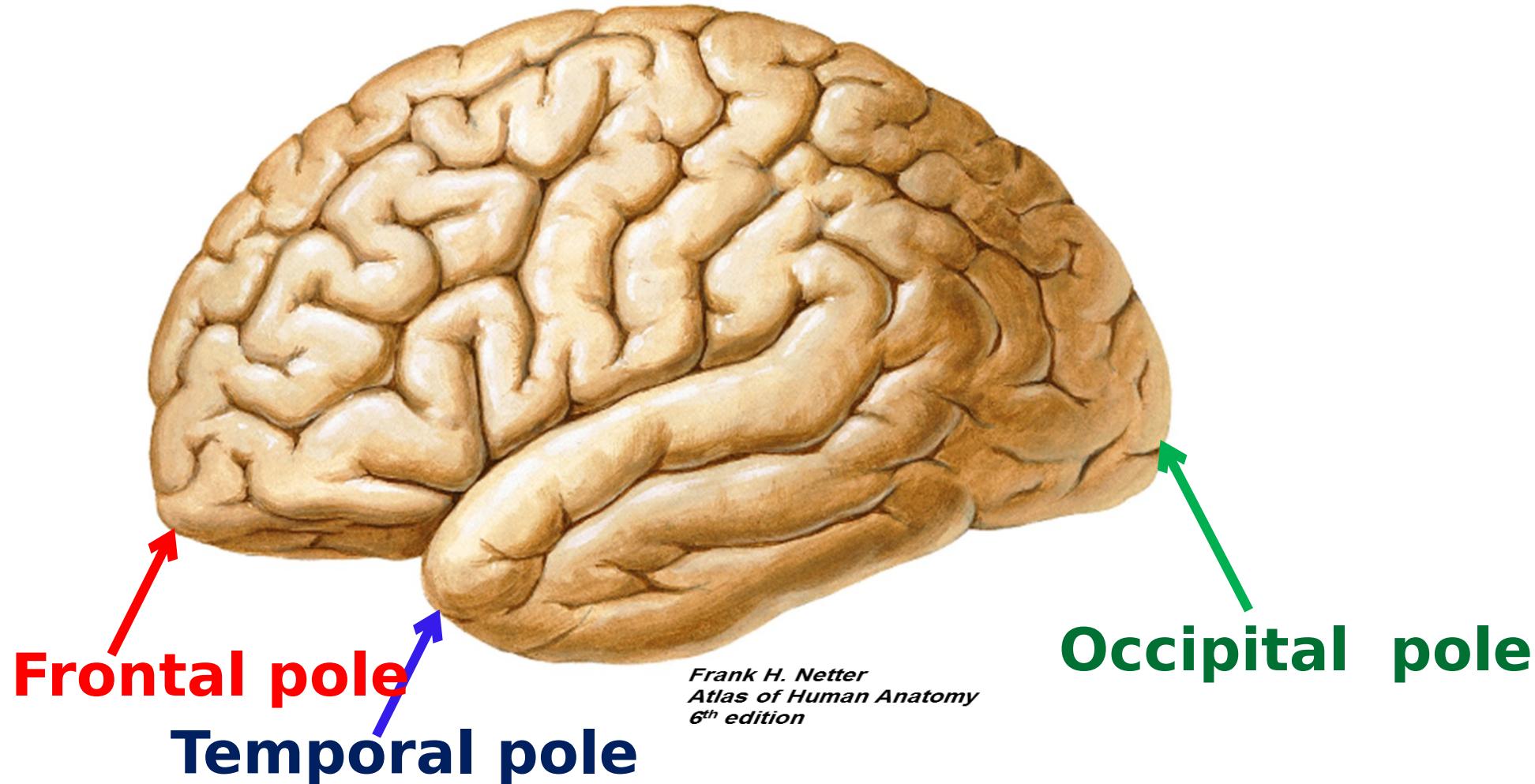
Sulci
Gyri



<https://lh3.googleusercontent.com/AAMg>

Surface of cerebral hemisphere is composed of grey matter (cerebral cortex) that is thrown into grooves “Sulci” separated by folds “Gyri” to increase the surface area of

Each cerebral hemisphere has 3 poles

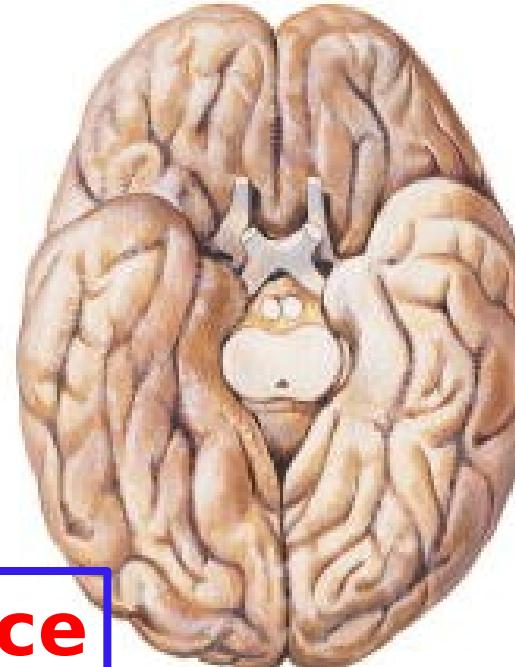


Each cerebral hemisphere has 3 surfaces

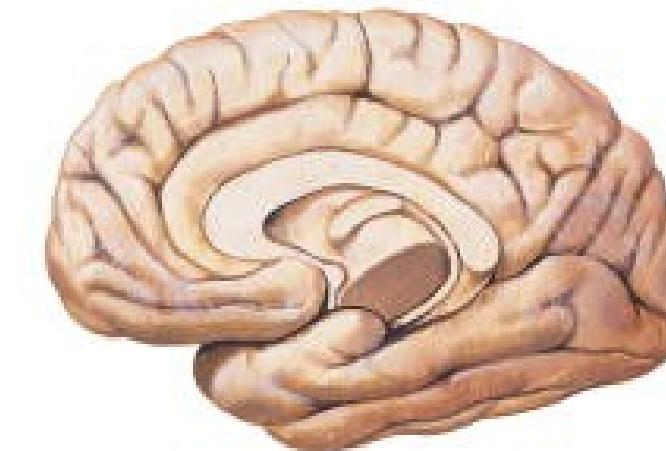


Lateral surface

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Inferior surface



Medial surface



**Main sulci that help
to divide the
cerebral
hemisphere into
lobes:**

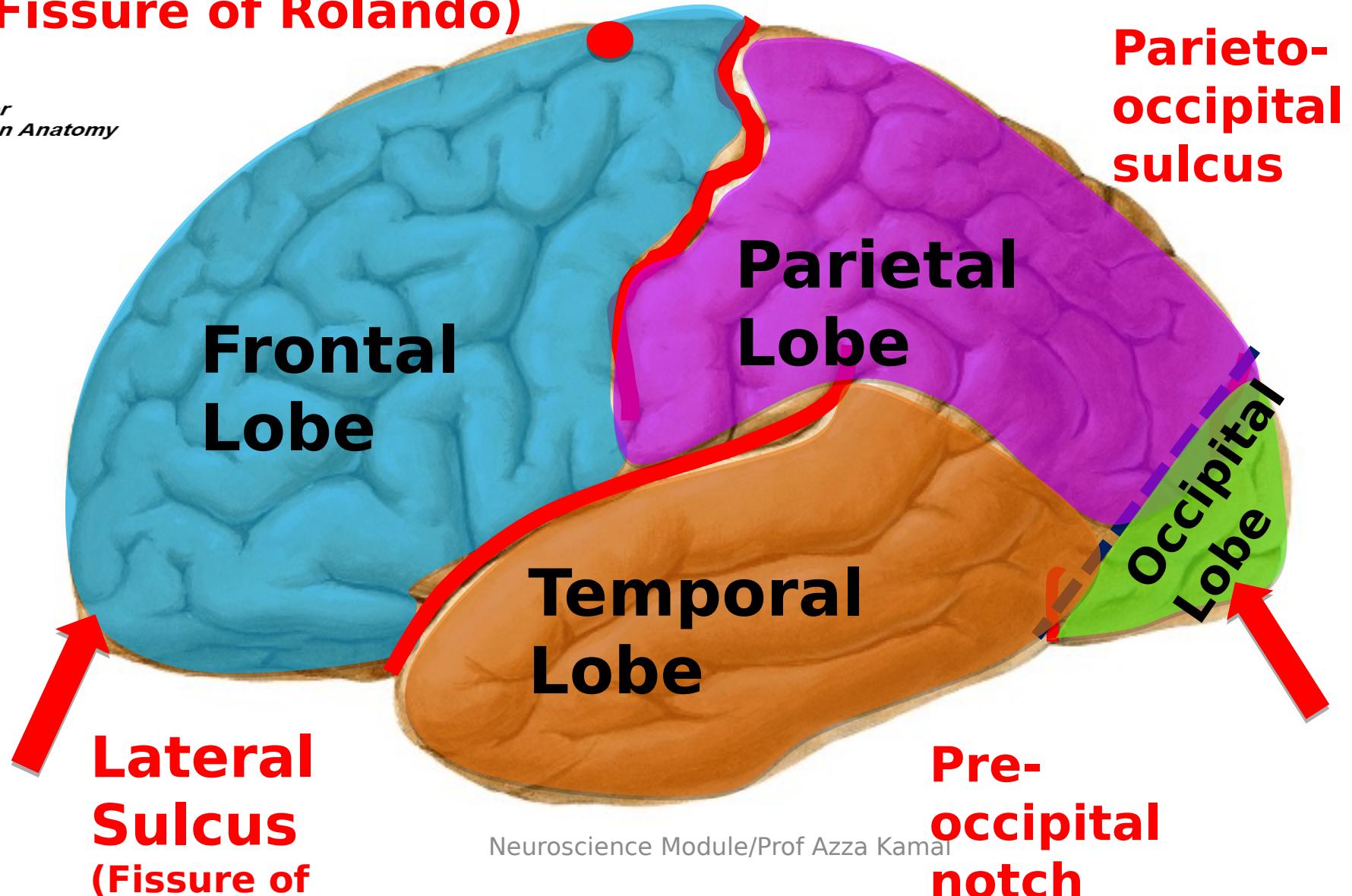


Central sulcus

(Fissure of Rolando)

One cm. behind midpoint between
frontal & occipital poles

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Lateral
Sulcus
(Fissure of

Pre-
occipital
notch

Other sulci on lateral surface of cerebral hemisphere

Sup frontal s
Inf frontal s

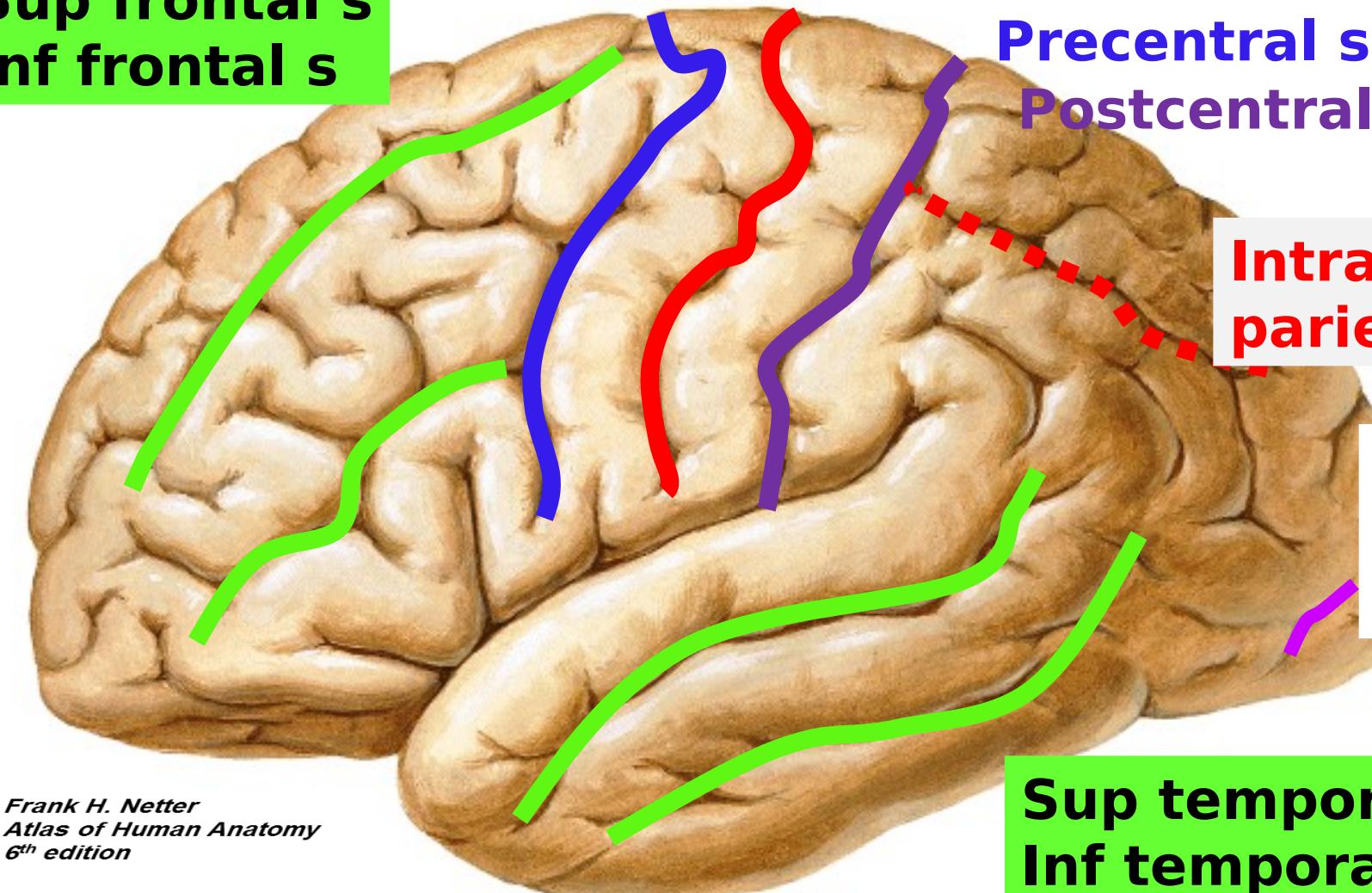
Central sulcus

Precentral sulcus
Postcentral sulcus

Intra-parietal s

Lunate sulcus

Sup temporal s
Inf temporal s



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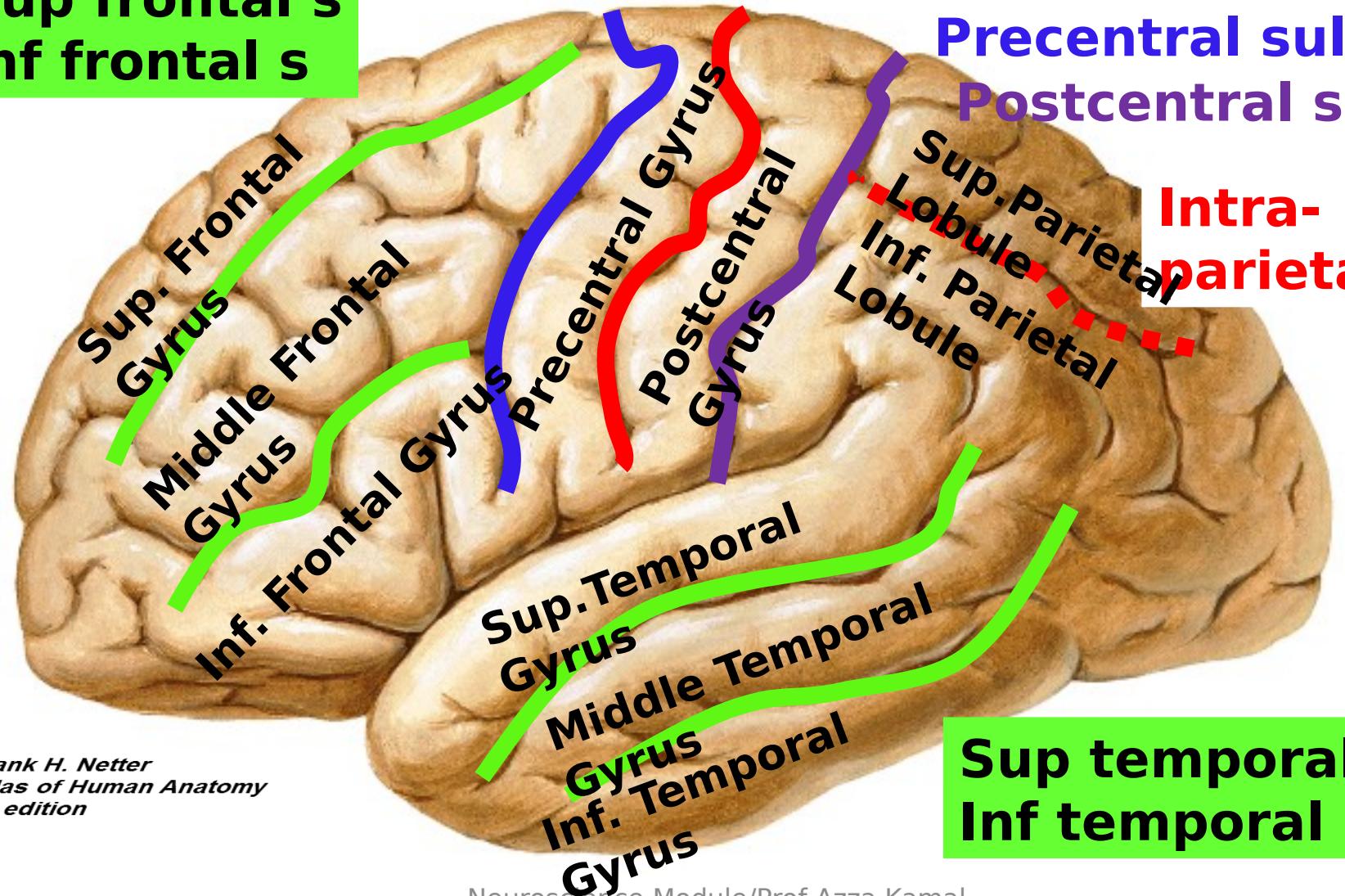
Gyri on lateral surface of cerebral hemisphere

Sup frontal s
Inf frontal s

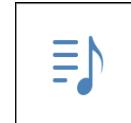
Central sulcus

Precentral sulcus
Postcentral sulcus

Intra-parietal s

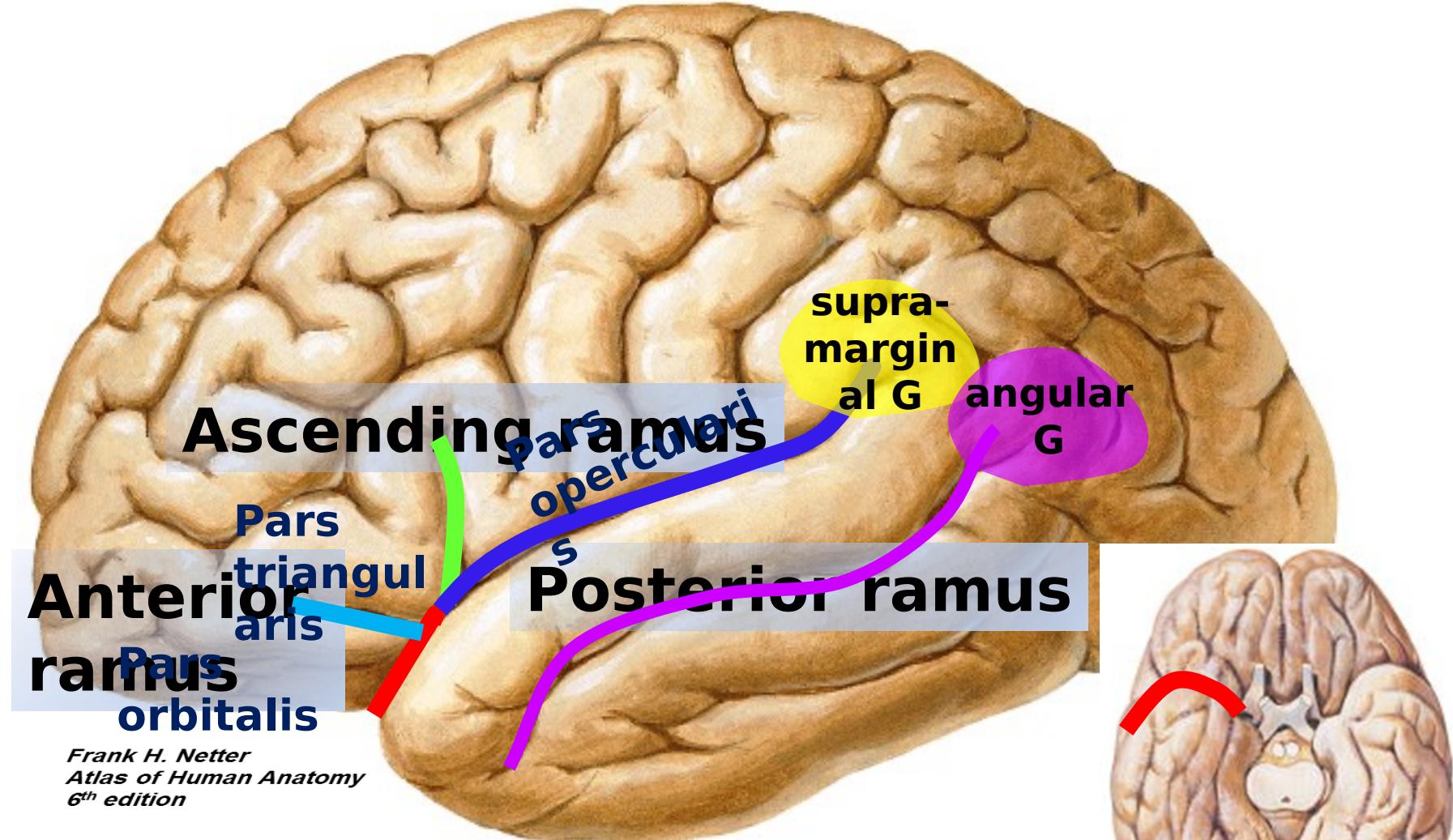


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Lateral sulcus

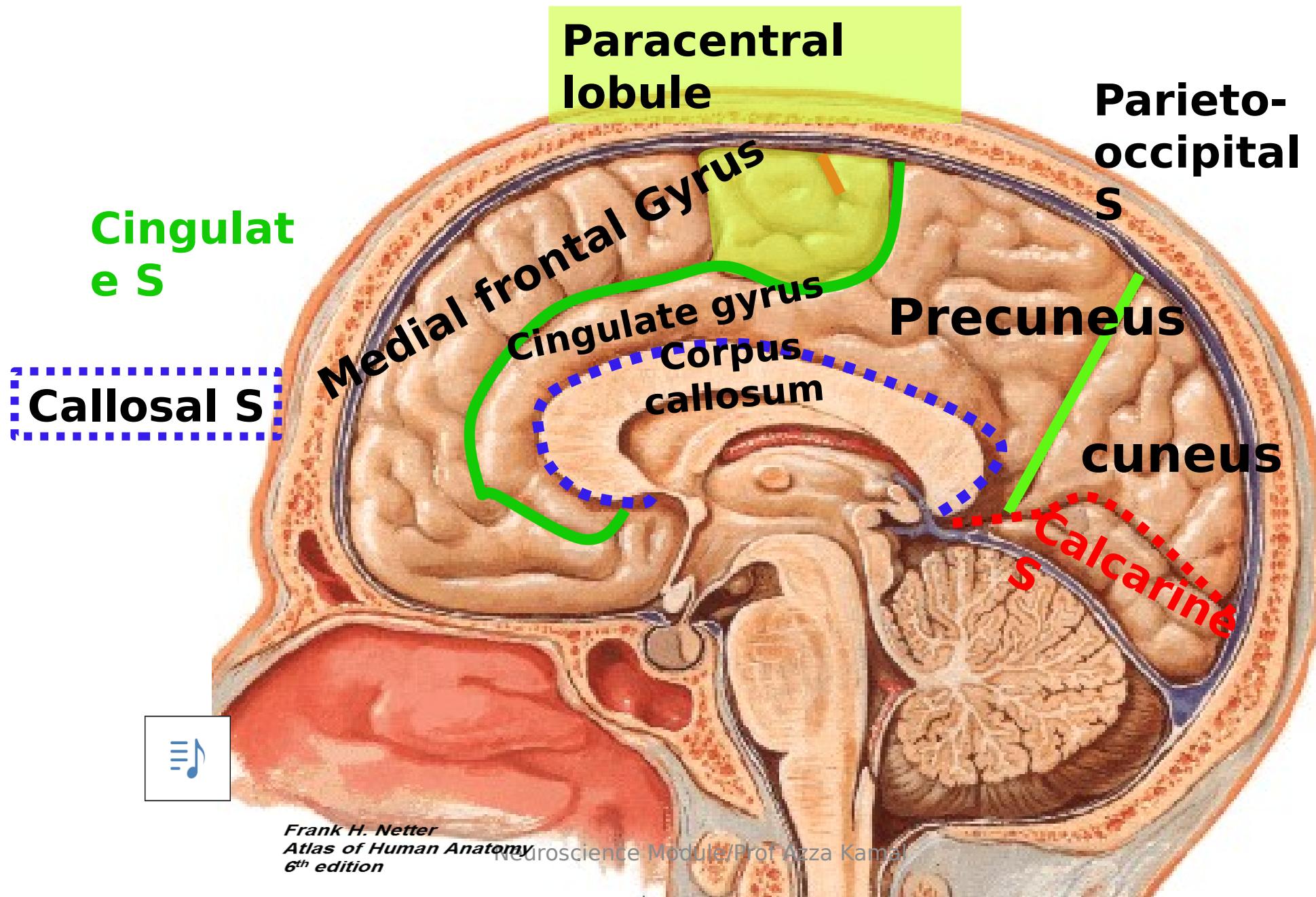


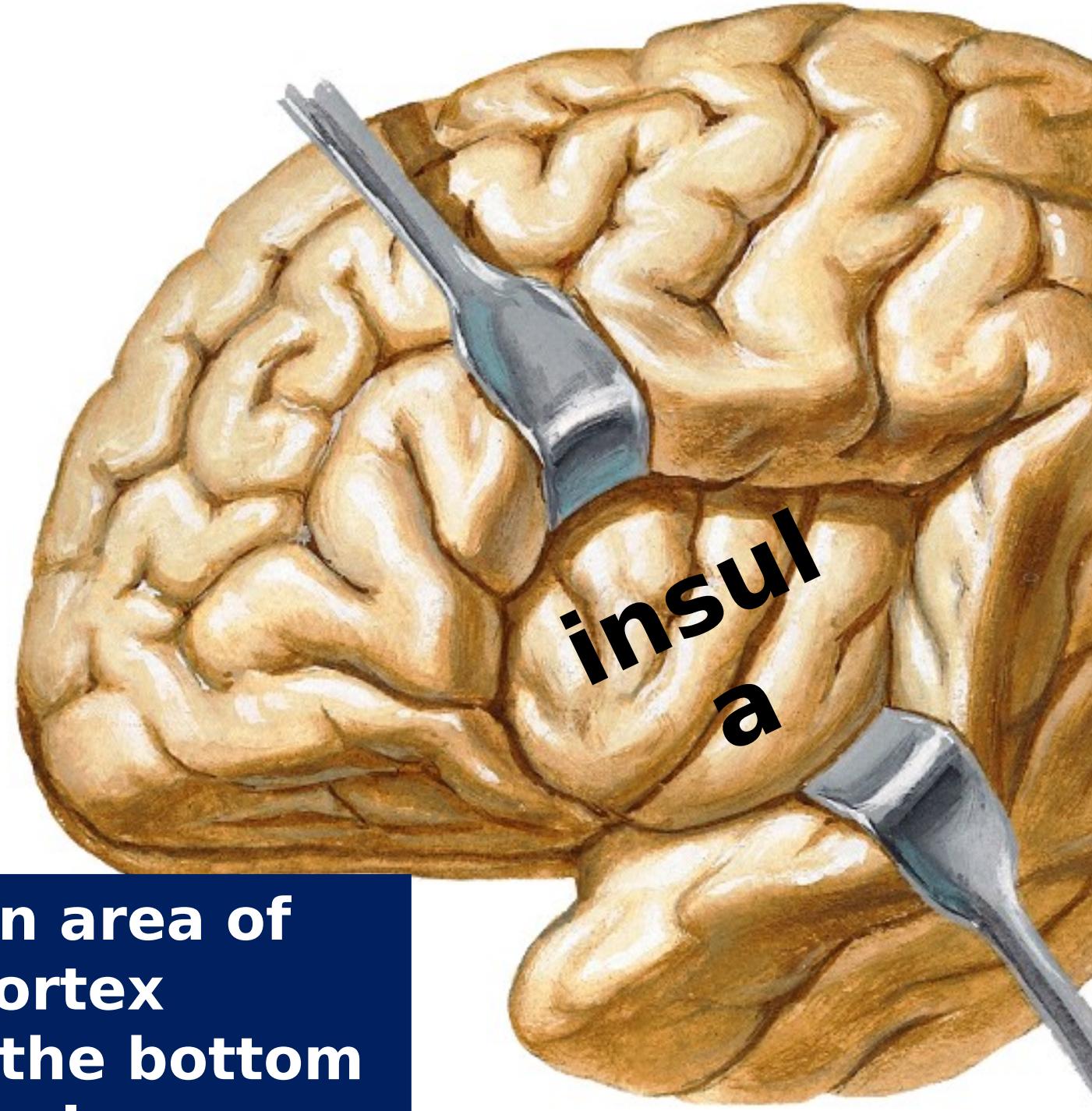
Stem + 3 rami

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Stem

Sulci & gyri on medial surface of cerebral hemisphere





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**Insula is an area of
cerebral cortex
hidden at the bottom
of the brain**



**Circular
sulcus**

**Central
sulcus**

Insula (Island of Reil)

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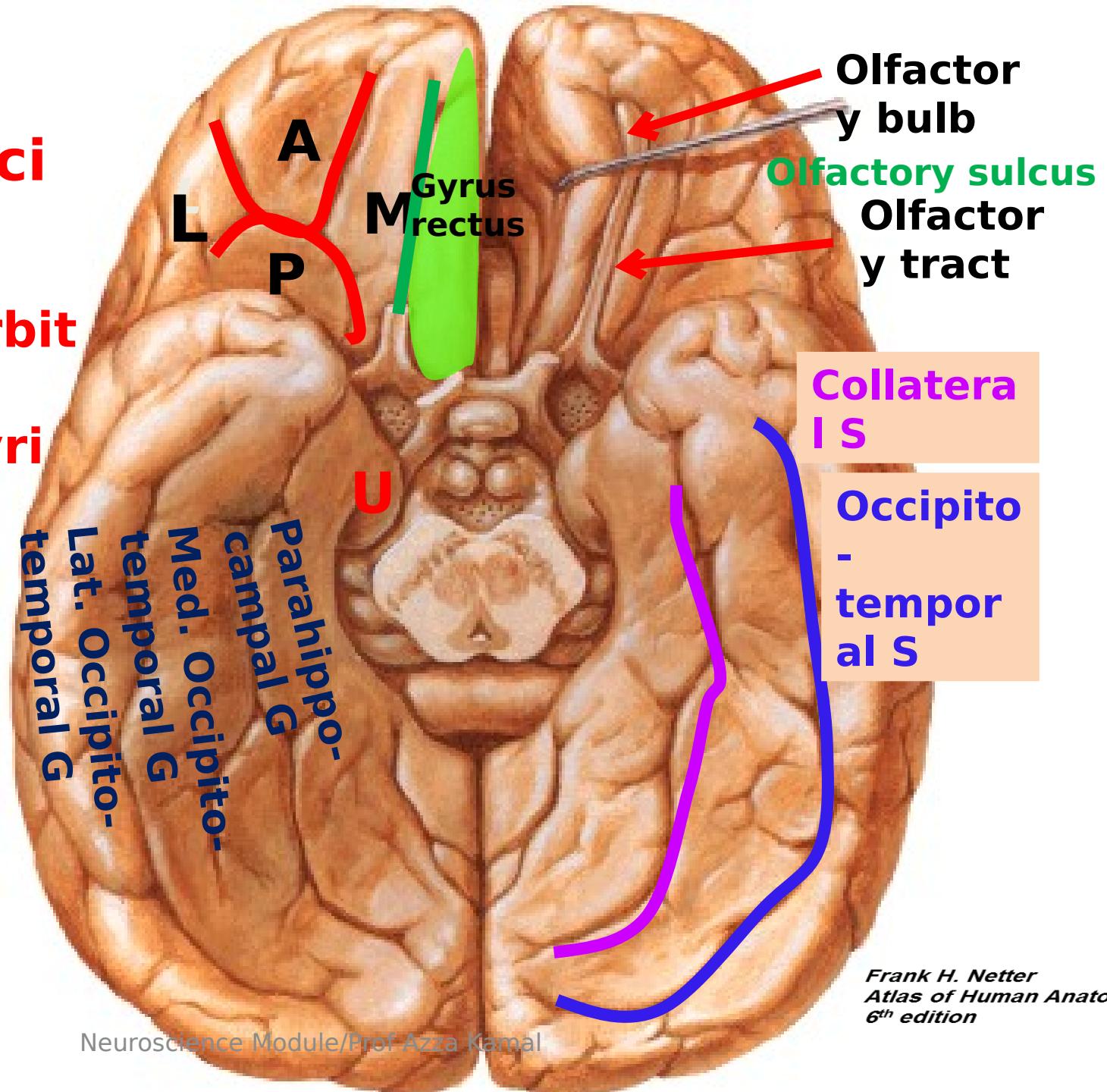
Function of insula:

- 1) Ant. Part ↴ Smell, taste & visceral sensation (autonomic)**
- 2) Post. Part ↴ 2nd somatosensory area**

H-shaped orbital sulci

A □ anterior
P □ posterior
M □ medial
L □ lateral
U □ uncus

Sulci &
Gyri on
inferior



Which of the following is an area of cerebral cortex hidden at the bottom of the lateral sulcus?

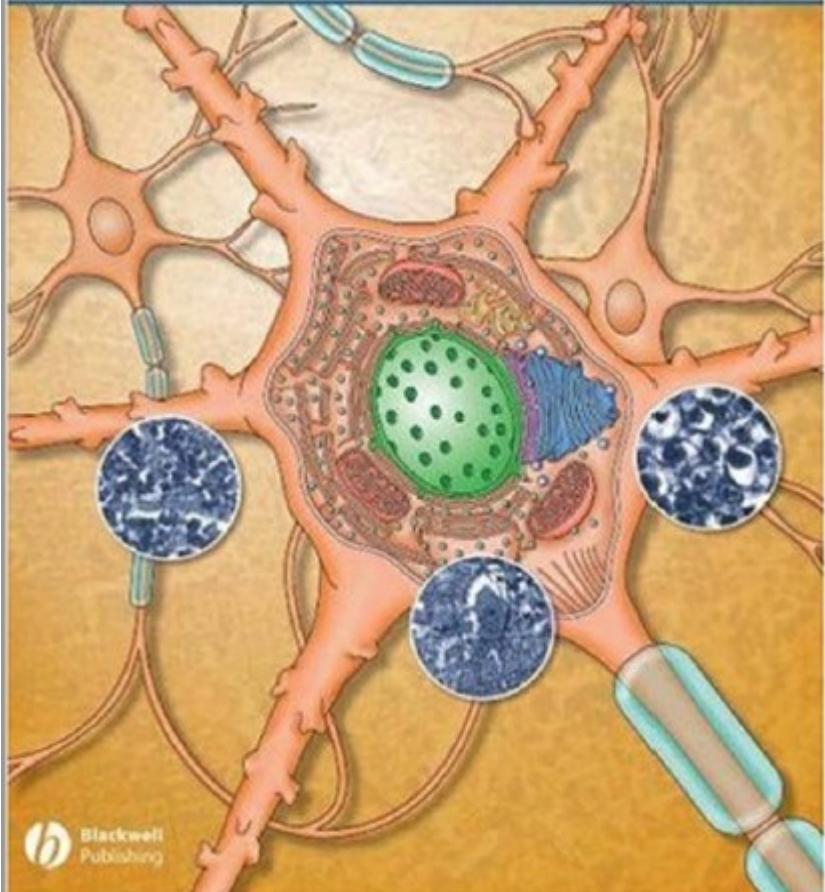
- A.Pars orbitalis
- B.Pars triangularis
- C.Pars opercularis
- D.Cuneus
- E.Insula



a textbook of

NEUROANATOMY

Maria A Patestas • Leslie P. Gartner



Chapter 23: cerebral cortex . PP:402-405

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Reference:

Clinical Neuroanatomy, Richard Snell, 7th edition
Sulci & gyri : Pages 257-262



**Thank
You**

